August 1, 2003

Mr. Floyd D. Nichols
On Scene Coordinator
USEPA Region 8
999 18th St., Suite 300
Denver, CO 80202-2466

Dear Mr. Nichols,

Attached are the 'as built" drawings and layout of the Traction Power Substation (TPSS) at the Delta Center Substation, 147 South 400 West, Salt Lake City. As will see there are many points of potential impact for possible contact with high voltage electricity.

We have not been able to find any records indicating that any excavated material was removed from the site during construction. We are also interviewing some of those who may have worked on the project to see if they remember any material being removed from the site. It was standard practice during construction to leave any material on the site as much as possible. It is indicated right now that material not placed into the foundation of the TPSS was graded back into the site.

We are in the process of getting the Utah Power Property Transaction ESA Baseline Report released send to you. That should be done by next week.

Sincerely,

Grantley Martelly

Grantley Martelly, REM
Utah Transit Authority
3600 South 700 West
Salt Lake City, UT 84130

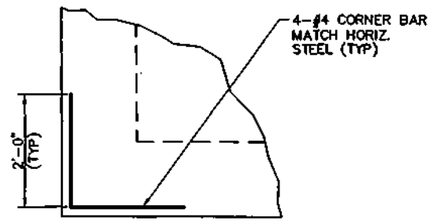
38'-0" (NTS) (SEE NOTE 12)
2'-6" | 6 SPACES @ 5'-6" (NTS) = 33'-0" (NTS) ANCHOR BOLT LOCATION | 2'-6"

NOTE 6 (TYP)
2"ø PVC CONDUIT FOR GROUND CONNECTION TO AC EQUIPMENT GROUND BUS
POS DC FEEDER CONDUITS 2-4"ø & 1-2"ø PVC (TYP. FOR 4 PLS)
7 1/2" TYP
2'-6" (TYP)
NEGATIVE RETURN CONDUITS 4"ø PVC
NEGATIVE DRAINAGE CONDUITS 4-4"ø PVC
(TYP ALL SIDES)
12KV HV CONDUITS FOR UTILITY CABLES 2-6"ø PVC
SLOPE LINES NOTE 9
2"ø PVC CONDUIT TO GROUND GRID FOR CONNECTION TO SUBSTATION FRAME
2% SLOPE TO DRAIN
OPP HAND
GRADE BEAM OUTLINE
OUTLINE OF SUBSTATION
SLOPE TO DRAIN
6'-0"
12'-0"
14'-0"
6'-6" NOTE 8
TELEPHONE CAB 2-4"ø PVC
APRON FOR 48" DOOR SECOND STAGE CONC
CONCRETE APRON FOR 36" DOOR SECOND STAGE CONC
36'-0" (NTS)
(TYP AT ANCHOR BOLT LOCATIONS)
(TYP)

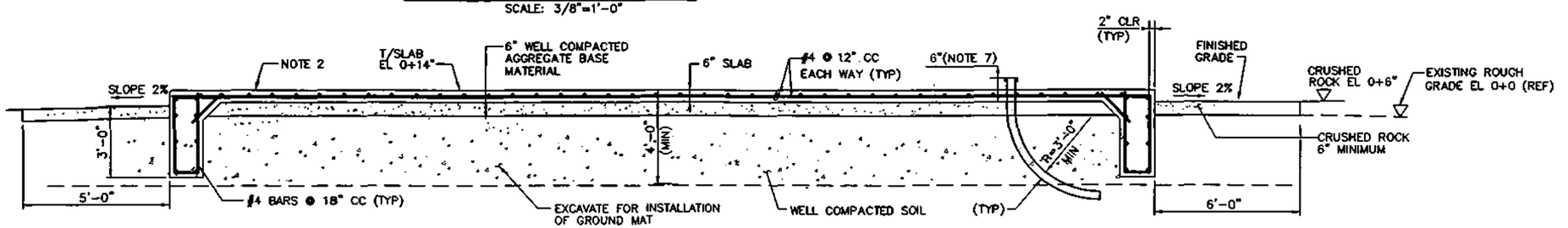
SUBSTATION FOUNDATION PLAN
SCALE: 3/8"=1'-0"

NOTES:

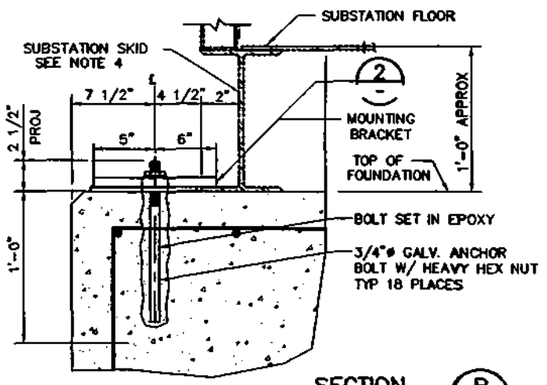
1. MINIMUM CONCRETE COMPRESSIVE STRENGTH SHALL BE (f'c) = 3000 PSI AT 28 DAYS.
2. CONCRETE SHALL BE TROWELLED TO SMOOTH FINISH TO PREVENT STANDING WATER.
3. CONTRACTOR SHALL REMOVE SOIL TO A DEPTH OF AT LEAST FOUR FEET BELOW PAD ELEVATION FOR INSTALLATION OF GROUND MAT. ALL BACKFILL MATERIAL SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY.
4. SKID IS PART OF UTA FURNISHED SUBSTATION.
5. CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL CONDUIT STUB-UPS ANCHOR BOLTS, FOUNDATION SLABS WITH SUBSTATION EQUIPMENT LAYOUT PLANS, PROVIDED BY THE ENGINEER.
6. CONFIRM ALL SKID DIMENSIONS WITH ENGINEER PRIOR TO CONSTRUCTION OF CONCRETE SLAB.
7. ALL CONDUIT STUB-UPS SHALL BE 6 INCHES ABOVE FINISH FLOOR.
8. COORDINATE FINAL APRON DIMENSIONS WITH SUBSTATION DOOR LOCATIONS.
9. SLOPE 1/8 INCH FROM CENTER OF SLAB TO EACH CORNER TO PREVENT STANDING WATER.
10. SLOPE FINISH GRADE A MINIMUM OF 2% ALL AROUND SLAB.
11. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1" AT 45°.
12. DIMENSIONS SHOWN ARE FOR MAIN LINE SUBSTATION. ADJUST DIMENSIONS AS REQUIRED FOR YARD SUBSTATION.



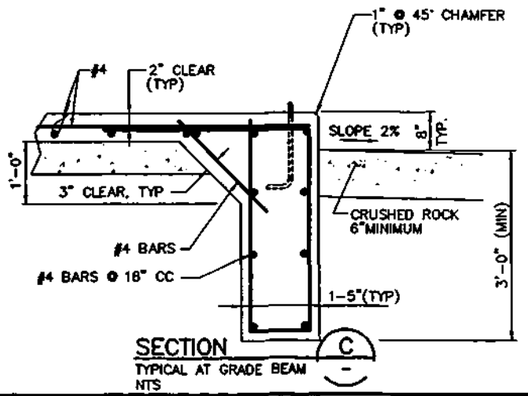
DETAIL 1 — CORNER BARS NTS



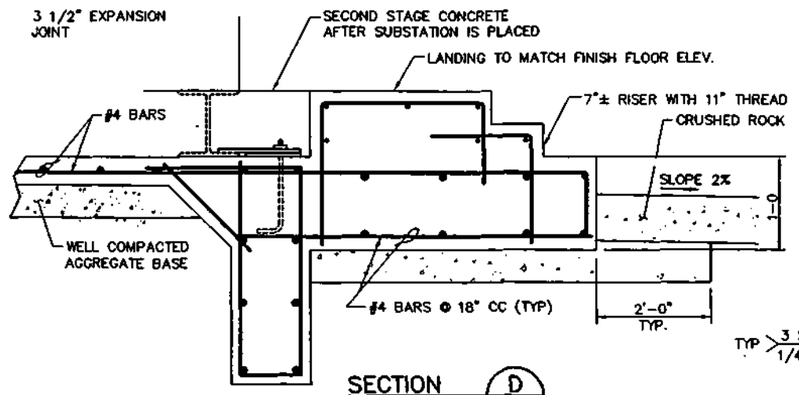
SECTION A
SCALE 3/8"=1'-0"



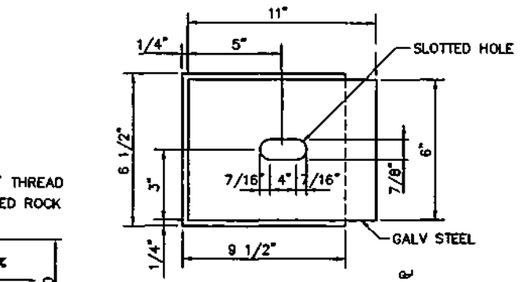
SECTION B
NTS



SECTION C
TYPICAL AT GRADE BEAM NTS



SECTION D
NTS



DETAIL 2 — MOUNTING BRACKET NTS

REV	DATE	Description
B	8/8/02	AS-BUILT MARK UP BY UTA
A	11/26/97	PC 03
0	8/23/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc. San Francisco, California

Submitted By:

UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By:

Designed By: Z. JARKIEWICZ
Drawn By: C.M. WONG
Checked By:
Approved By:

TRACTION POWER AND SIGNALING
TRACTION POWER SUBSTATION
TYPICAL SUBSTATION FOUNDATION

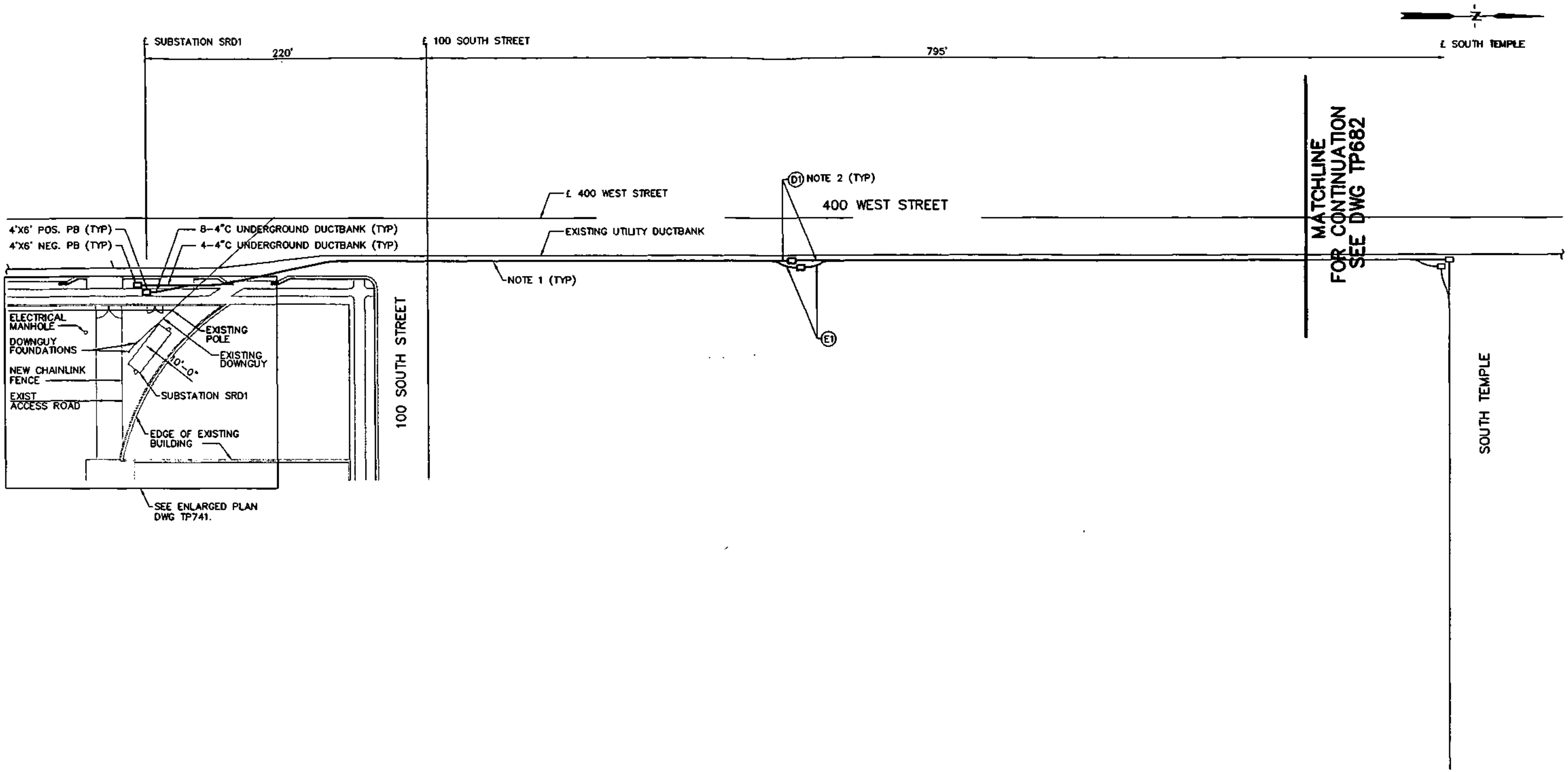
Scale: AS SHOWN
CADD Filename: L54TP661
Submittal Date: MAY 13, 1997
UTA Contract No.: UT-17VT-L54
Drawing No.: TP661
Sheet No.: 169

L:\North-South As-builts\CAD Work\As-Built Submittal April 2003\L54\L54TP740.DWG, 06/23/2003 03:4?PM, csiamo, Carlee

XREF'S
NA
REVSTAMP
TPCSD1
UTABOR
WE-UTA

NOTES:

1. DUCTBANKS AND PULL BOXES ON THIS DRAWING ARE BY CIVIL CONTRACT.
2. FOR CABLE SCHEDULE, SEE DWG TP741.



PROJECT CONTROL DATE: 08/28/97 15:50:00 CAD FILENAME: C:\UTA\l54tp670.DWG (C9) RD/DHL PLOTTED SCALE: 1=40<D>

REV	DATE	Description
AB	12/19/02	AS-BUILT MARK-UPS BY UTA
A	8/23/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR
AS-BUILT DRAWING
RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By: ____________

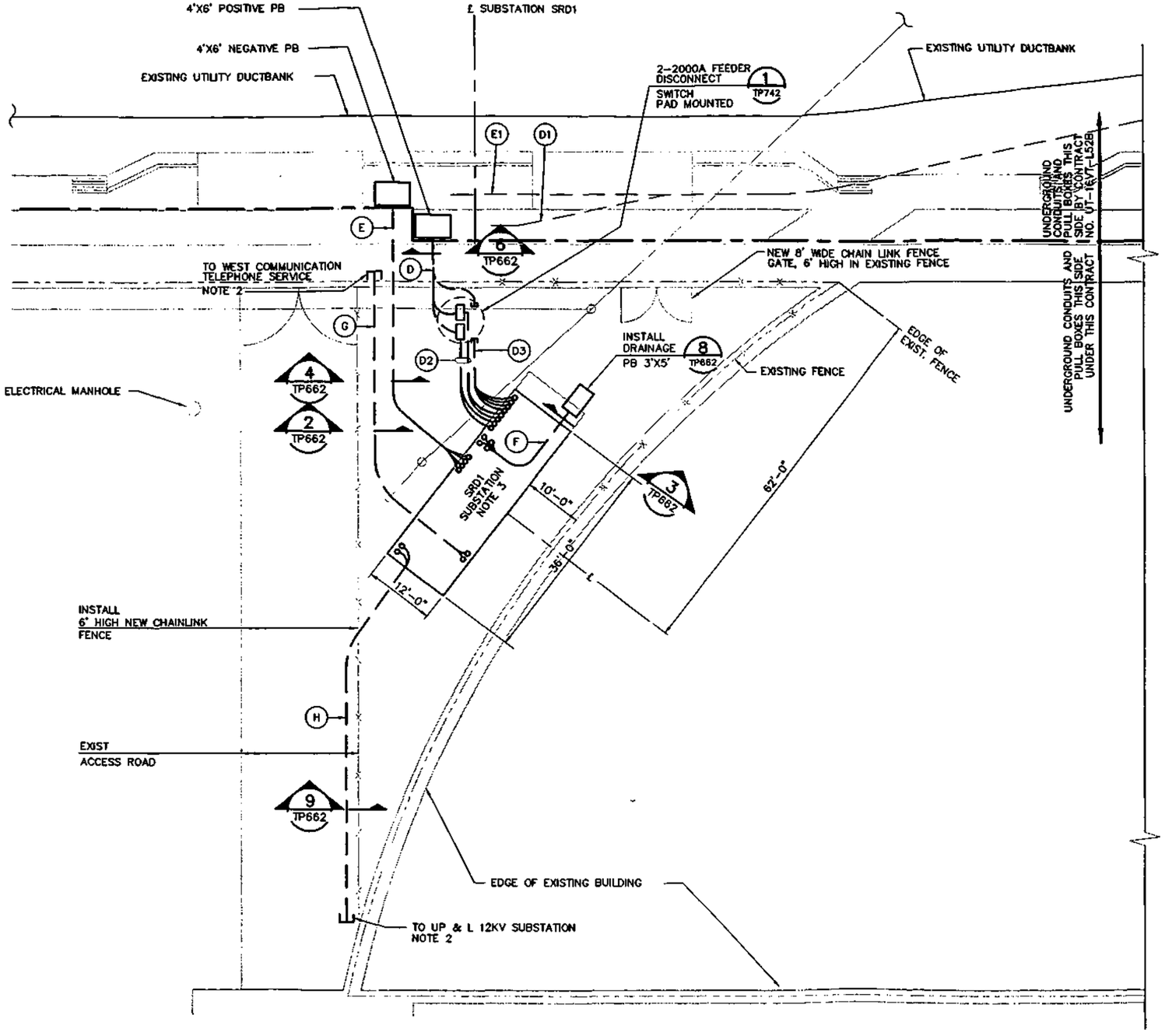
UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By: ____________

Designed By: R.C. DHINGRA
Drawn By: F. FONG
Checked By:
Approved By:

TRACTION POWER AND SIGNALING II
DELTA CENTER SUBSTATION
UNDERGROUND RACEWAY AND CABLE PLANS
SUBSTATION SRD1
SHEET 1 OF 2

Scale: 1"=40'-0"
CADD Filename: L54TP740
Schedule Date: MAY 13, 1997
UTA Contract No.: UT-17VT-L54
Drawing No.: TP740
Sheet No.: 199



NOTES:

1. CONTRACTOR SHALL INSTALL PVC CONDUITS FOR THE UTILITY POWER SUPPLY IN ACCORDANCE WITH UP & L REQUIREMENTS.
2. STUBOUT AND CAP.
3. FOR SYMBOLS AND ABBREVIATIONS AND GENERAL NOTES, SEE DWG TP601.
4. FOR FOUNDATION AND GROUND MAT REQUIREMENTS, SEE DRAWING TP661 AND TP750.

RACEWAY AND CABLE INSTALLATION SCHEDULE

DUCT BANKS	CONDUIT	CABLE	FEEDER	CONDUIT ASSIGNMENT
(D)	1-4"	2-500 MCM	172-2	SOUTHBOUND FEEDER
	1-4"	2-500 MCM	172-2	SOUTHBOUND FEEDER
	1-4"	2-500 MCM	172-1	NORTHBOUND FEEDER
	1-4"	2-500 MCM	172-1	NORTHBOUND FEEDER
	2-4"	SPARE		FUTURE SOUTHBOUND FEEDER
	2-4"	SPARE		FUTURE NORTHBOUND FEEDER
(D1)	1-4" (NIC)	2-500 MCM	172-2	SOUTHBOUND FEEDER
	1-4" (NIC)	2-500 MCM	172-2	SOUTHBOUND FEEDER
	1-4" (NIC)	2-500 MCM	172-1	NORTHBOUND FEEDER
	1-4" (NIC)	2-500 MCM	172-1	NORTHBOUND FEEDER
	2-4" (NIC)	SPARE		FUTURE SOUTHBOUND FEEDER
	2-4" (NIC)	SPARE		FUTURE NORTHBOUND FEEDER
(E)	1-4"	3-500 MCM		NEGATIVE RETURN
	1-4"	3-500 MCM		NEGATIVE RETURN
	2-4"	SPARE		FUTURE NEGATIVE RETURN
(E1)	1-4" (NIC)	3-500 MCM		NEGATIVE RETURN
	1-4" (NIC)	3-500 MCM		NEGATIVE RETURN
	2-4" (NIC)	SPARE		FUTURE NEGATIVE RETURN
(F)	4-2"	--	DR1-DR4 CONTACTORS	DRAINAGE CKT
(G)	2-4"	--		TELEPHONE
(H)	2-6"	--		UTILITY 12KV POWER SUPPLY
(D2)	1-4"	2-500 MCM	172-2	SOUTHBOUND FEEDER
	1-4"	2-500 MCM	172-2	SOUTHBOUND FEEDER
	1-4"	2-500 MCM	172-1	NORTHBOUND FEEDER
	1-4"	2-500 MCM	172-1	NORTHBOUND FEEDER
(D3)	2-4"	SPARE		FUTURE SOUTHBOUND FEEDER
	2-4"	SPARE		FUTURE NORTHBOUND FEEDER

REV	DATE	Description
A	6/23/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By

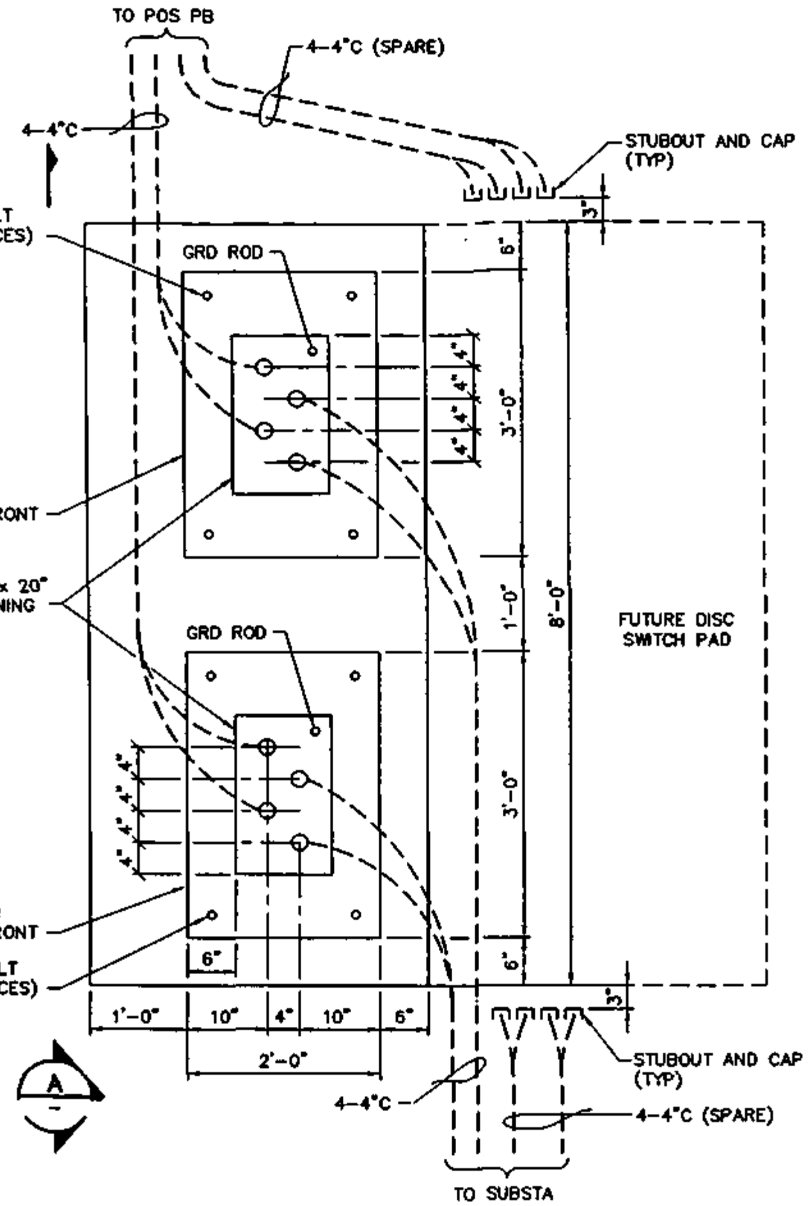
UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By

Designed By: R. DHINGRA
Drawn By: F. FONG
Checked By:
Approved By:

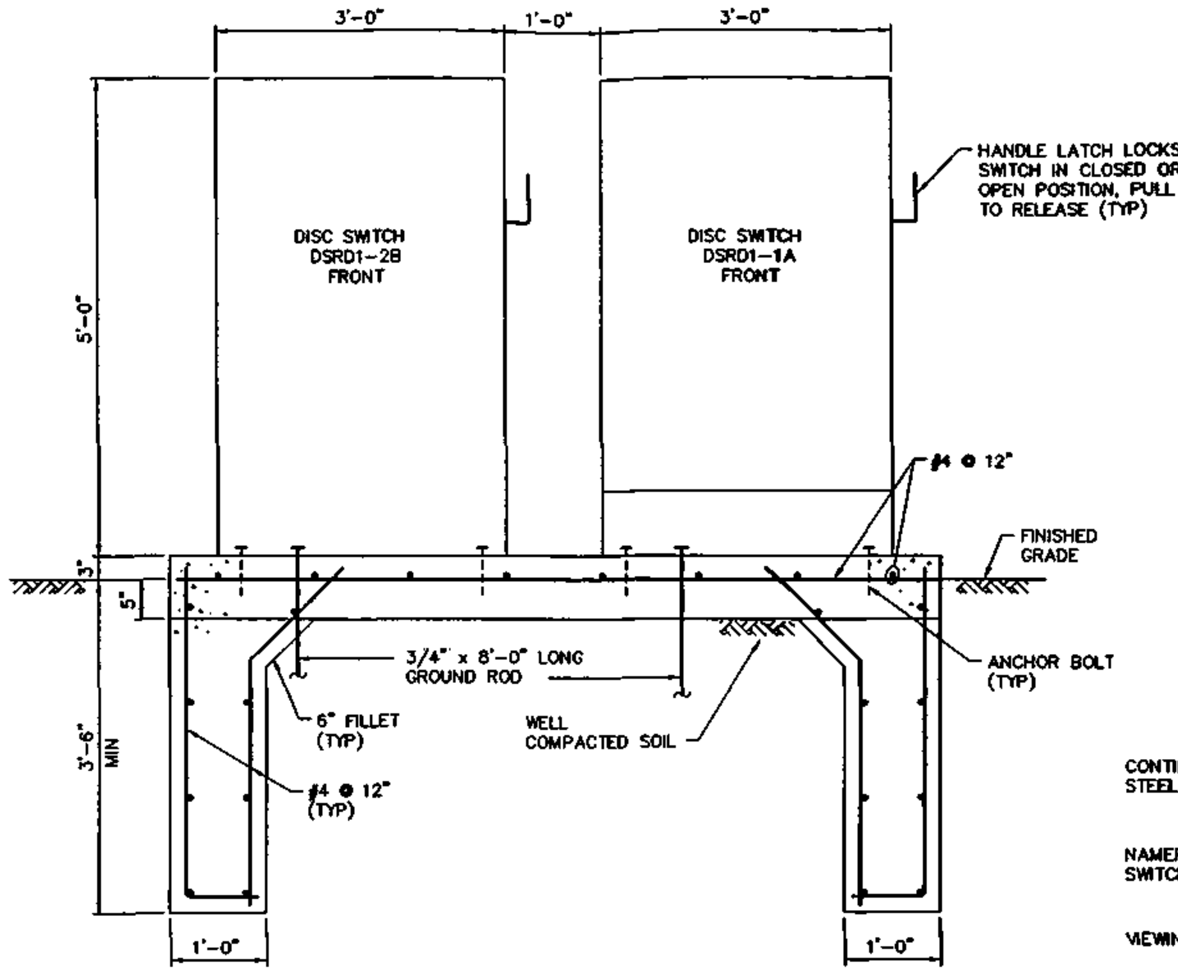
TRACTION POWER AND SIGNALING
DELTA CENTER SUBSTATION
UNDERGROUND RACEWAY AND CABLE PLANS
SUBSTATION SRD1
SHEET 2 OF 2

Scale: 1"=10'-0"
CADD Filename: L54TP748
Submitted Date: MAY 13, 1997
UTA Contract No.: 95-17VT-L54
Drawing No.: TP748
Sheet No.: 200

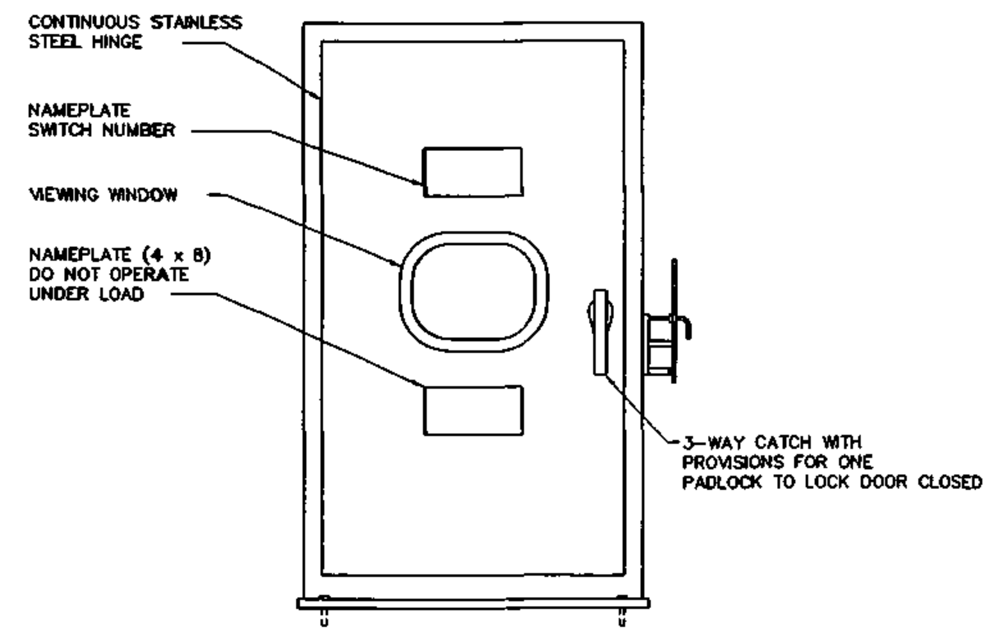


PLAN

DETAIL 1 TP741
SCALE: 1" = 1'-0"



SECTION A
SCALE: 1" = 1'-0"



FRONT VIEW WITH GASKETED DOOR
NTS

REV	DATE	Description
AB	12/19/02	AS-BUILT MARK-UPS BY UTA
A	8/23/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By: ______

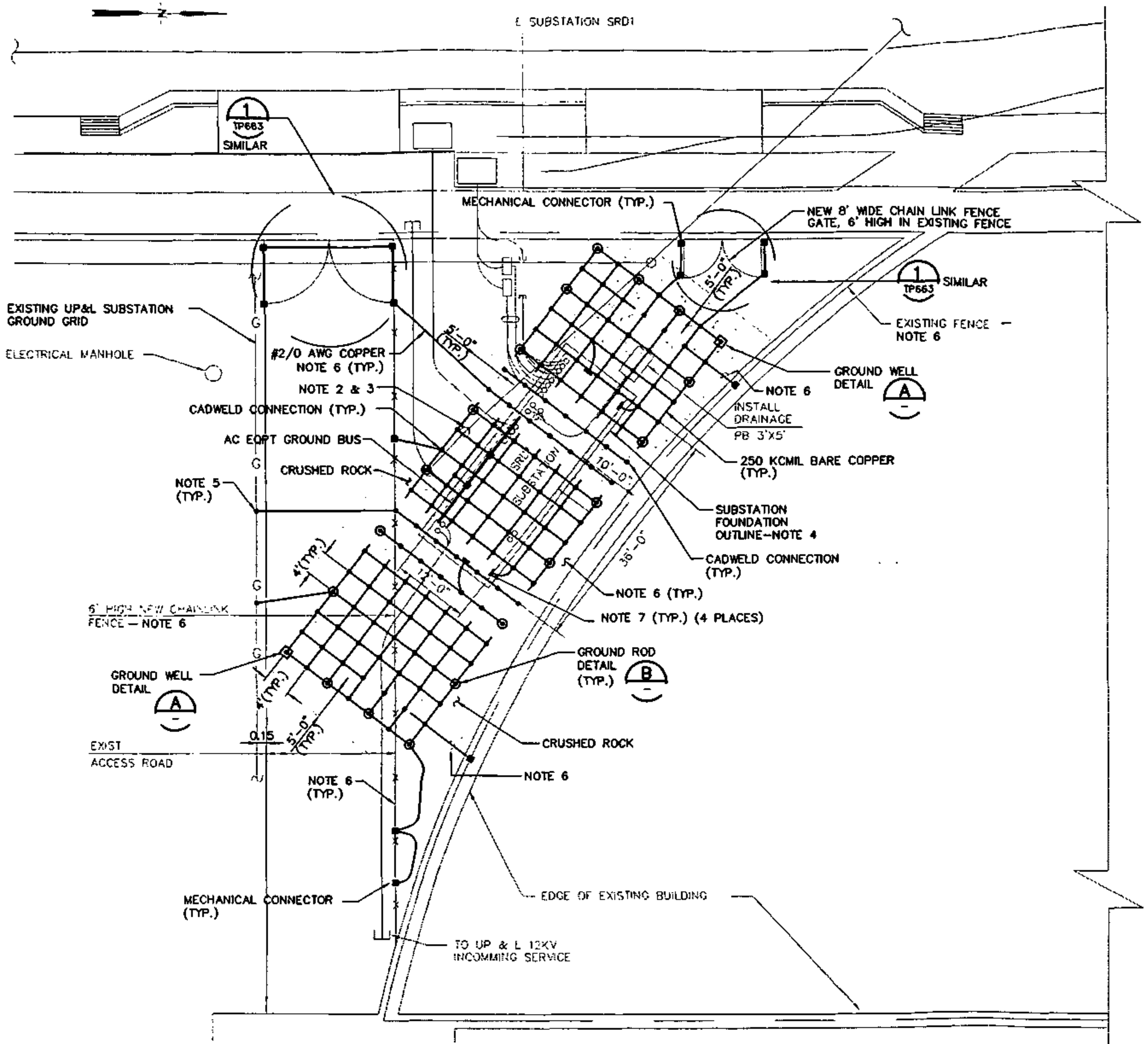
UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By: ______

Designed By: G. GIN
Drawn By: S. LEE
Checked By:
Approved By:

TRACTION POWER AND SIGNALING
DELTA CENTER SUBSTATION
PAD MOUNTED DISCONNECT SWITCHES
DETAILS

Scale: AS SHOWN
CADD Filename: L54TP742
Submittal Date: MAY 13, 1997
UTA Contract No.: UT-17VT-L54
Drawing No.: TP742
Sheet No.: 201

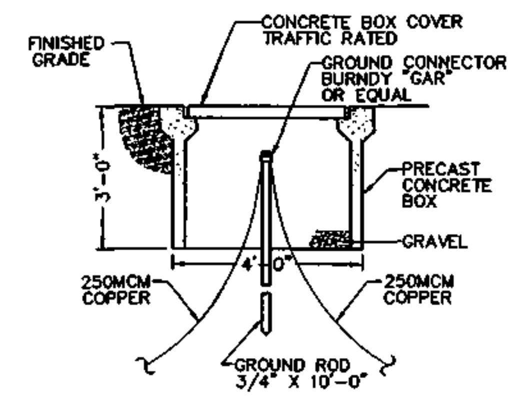


GROUNDING PLAN — SUBSTATION SRD1

SCALE: 1"=10'-0"

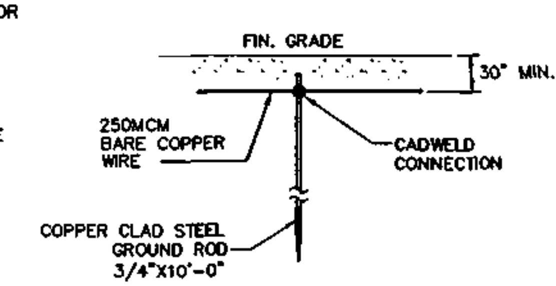
NOTES:

1. MAIN GROUND GRID MAT SHALL CONSIST OF 250MCM AWG BARE COPPER CONDUCTORS BURIED 2'-6" BELOW FINISHED GRADE. AC EQUIPMENT GROUND BUS SHALL BE CONNECTED TO MAIN GROUND GRID WITH 250MCM AWG COPPER CABLE.
2. BOND EXISTING DOWN GUY TO GROUND GRID WITH #4/0 AWG BARE COPPER.
3. INSTALL PVC SCHED 40 SPLIT SLEEVE CONDUT OVER EXISTING DOWN GUY. SLEEVE SHALL EXTEND FROM GROUND LEVEL TO 6 FEET BEYOND ROOF OF SUBSTATION.
4. FOR FOUNDATION DETAILS, SEE DRAWING TP661.
5. CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF EXISTING UP&L SUBSTATION GROUND GRID SYSTEM LOCATED BELOW GRADE. CONNECT NEW GROUND GRID TO THE EXISTING GRID USING 250MCM AWG COPPER CONDUCTORS VIA CADWELD CONNECTIONS.
6. CONTRACTOR SHALL GROUND ALL FENCE POSTS, GATE POSTS, FENCE SECTIONS USING #2/0 AWG GROUND WIRE AND CONNECT TO NEW GROUND GRID USING CADWELD CONNECTIONS FOR EXISTING AND NEW CHAIN LINK FENCES.
7. PROVIDE 10' LONG 250MCM COPPER BARE WIRE PIGTAILS ROUTED THROUGH SLAB FOR CONNECTIONS TO GROUNDING PADS INSIDE SUBSTATION.



GROUND WELL DETAIL (A)

N.T.S.



GROUND ROD DETAIL (B)

N.T.S.

REV	DATE	Description
A	9/11/02	AS-BUILT MARK UP BY UTA
0	8/23/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By: ____

UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By: ____

Designed By: N.K. SOOD
Drawn By: C.M. WONG
Checked By:
Approved By:

TRACTION POWER AND SIGNALING
DELTA CENTER SUBSTATION
GROUNDING PLAN
SUBSTATION SRD1

Scale: 1"=10'-0"
CADD Filename: L54TP750
Submittal Date: JULY 7, 1997
UTA Contract No.: UT-17VT-L54
Drawing No.: TP750
Sheet No.: 201A

PROJECT CONTROL DATE: 08/20/97

UTA

UTAH TRANSIT AUTHORITY

SALT LAKE BUS/RAIL PROJECT

SALT LAKE CITY, UTAH

APRIL 2003

TRACTION POWER SUBSTATION – PROCUREMENT

CONTRACT NUMBER: UT-11VT-L35

BRW DMJM
A JOINT VENTURE

Civil Final Design

WE
PGH Wong Engineering, Inc.
San Francisco, California

AS-BUILT
RECORD DRAWINGS

DOCUMENT 1 of 1

INDEX OF DRAWINGS

SHEET No	DWG No	TITLE	REV
		GENERAL	
	--	LOCATION PLAN	
1	TP500	INDEX OF DRAWINGS	
		TRACTION POWER SUBSTATION PROCUREMENT	
2	TP501	SYMBOLS AND ABBREVIATIONS	
3	TP502	MASTER SINGLE-LINE DIAGRAM SHEET 1 OF 4	
4	TP503	MASTER SINGLE-LINE DIAGRAM SHEET 2 OF 4	
5	TP504	MASTER SINGLE-LINE DIAGRAM SHEET 3 OF 4	
6	TP505	MASTER SINGLE-LINE DIAGRAM SHEET 4 OF 4	
7	TP506	TYPICAL SINGLE-LINE SUBSTATION METER AND RELAY DIAGRAM	
8	TP507	TYPICAL SINGLE-LINE SUBSTATION YRY1 METER AND RELAY DIAGRAM	
9	TP509	ANNUNCIATOR WINDOW ARRANGEMENT	
10	TP510	TYPICAL SUBSTATION EQUIPMENT ARRANGEMENT SUBSTATIONS AT GRADE LEVEL AND YRY1	
11	TP512	TYPICAL SUBSTATION SECTIONS	
12	TP514	SUBSTATION EQUIPMENT ARRANGEMENT UNDERGROUND VAULT SUBSTATION SRT2	

SHEET No	DWG No	TITLE	REV

REV	DATE	Description
A5	11/11/02	AS-BUILT MARK UP BY UTA
A	4/15/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR
AS-BUILT DRAWING
RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By: _____

UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By: _____

Designed By:	R.C. DHINGRA
Drawn By:	D.S. TALLITSCH
Checked By:	E.J. ROWE
Approved By:	J.N. KATZ

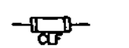
TRACTION POWER SUBSTATION
PROCUREMENT
INDEX OF DRAWINGS

Scale:	NONE
CADD Filename:	L35TP500
Submittal Date:	12/23/98
UTA Contract No.:	UT-11VT-L35
Drawing No.:	TP500
Sheet No.:	1

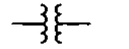
ABBREVIATIONS

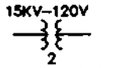
A	AMPERE
AC	ALTERNATING CURRENT
ANN	ANNUNCIATOR
AS	AMMETER SWITCH
AUX	AUXLIARY
AWG	AMERICAN WIRE GAUGE
BC	BARE COPPER
BKR	BREAKER
CND,C	CONDUIT
CKT	CIRCUIT
CPT	COMPARTMENT
CTB	CURRENT TEST BLOCK
CS	CONTROL SWITCH
DC	DIRECT CURRENT
DSF	FEEDER DISCONNECT SWITCH
DISC	DISCONNECT
DWG	DRAWING
EF	EXHAUST FAN
EL., ELEV	ELEVATION
FD	FIRE/SMOKE DETECTOR
FUT	FUTURE
GRD	GROUND
HP	HORSEPOWER
HTR	HEATER
Hz	HERTZ
JB	JUNCTION BOX
KV	KILOVOLT
KW	KILOWATT
KVA	KILOVOLT-AMPERE
LO	LOCKOUT
LS	LIMIT SWITCH
MCM	KILO CIRCULAR MILS
MH	MANHOLE
NIC	NOT IN CONTRACT
N.C.	NORMALLY CLOSED
NEG,N	NEGATIVE
NEUT	NEUTRAL
N.O.	NORMALLY OPEN
NTS	NOT TO SCALE
OCS	OVERHEAD CONTACT SYSTEM
P	POLE
PB	PULL BOX
PNL	PANEL
POS,P	POSITIVE
PS	POINT OF SWITCH
PVC	POLYVINYL CHLORIDE
QTY	QUANTITY
RGS	RIGID GALVANIZED STEEL
UTA	UTAH TRANSIT AUTHORITY
SA	SURGE ARRESTER
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SW	SWITCH
SWGR	SWITCHGEAR
T	TRANSDUCER
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
V	VOLT, VOLTMETER
VA	VOLT-AMPERE
VT	VOLTAGE TRANSFORMER
VS	VOLTMETER SWITCH
WP	WEATHERPROOF
XFMR	TRANSFORMER

SYMBOLS

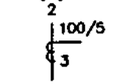


FUSE
CLF = CURRENT LIMITING FUSE


RECTIFIER TRANSFORMER



POTENTIAL TRANSFORMER [UPPER-NO. RATIO, LOWER-NO. QTY OF XFMR

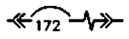


CURRENT TRANSFORMER

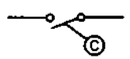

3-PHASE DELTA CONNECTION


3-PHASE WYE CONNECTION

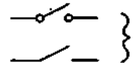
AC CIRCUIT BREAKER, DRAWOUT



DC CIRCUIT BREAKER, WITH SERIES TRIP ELEMENT, 1-POLE, DRAWOUT TYPE



DC CONTACTOR, 1-POLE


DISCONNECT SWITCH, 1-POLE

VOLTMETER

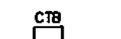
VOLTMETER SWITCH

AMMETER

WATTHOUR METER

AMMETER SWITCH

RELAY OPERATING COIL NUMBER DESIGNATES RELAY TYPE



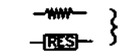
LIGHTNING ARRESTER

CURRENT TEST BLOCK

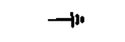
POTENTIAL TEST BLOCK

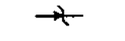
SYMBOLS

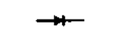
FUNCTIONAL INTERCONNECTION AMONG CONTROL, PROTECTIVE, AND POWER DEVICES (ARROW DENOTES DIRECTION OF CONTROL)

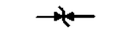


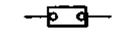
RESISTOR

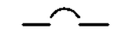

GROUND


ZENER/DC SURGE SUPPRESSOR

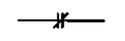

POWER RECTIFIER OR DIODE

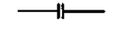

AC SURGE SUPPRESSOR

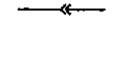

DC SHUNT

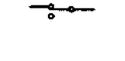

DISTRIBUTION PANEL CIRCUIT BREAKER

3-500MCM QUANTITY AND SIZE OF CABLES

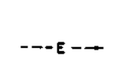

RELAY CONTACT NORMALLY CLOSED


RELAY CONTACT NORMALLY OPEN

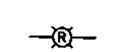

SEPARABLE CONNECTOR


SINGLE POLE DOUBLE THROW SWITCH

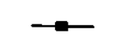
KEY INTERLOCK



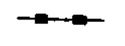
MECHANICAL INTERLOCK

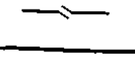


ELECTRICAL INTERLOCK



INDICATING LIGHT: R-RED, G-GREEN, A-AMBER W-WHITE, C-CLEAR, B-BLUE


SECTION INSULATOR


OVERHEAD BRIDGE SUPPORT


AIR GAP/CATENARY OVERLAP

LAYOUT SYMBOLS


EMERGENCY LIGHTING FIXTURE


DUPLEX RECEPTACLE OUTLET (20 AMP)


WALL MOUNTED LIGHT FIXTURE

REV	DATE	Description
A5	11/11/02	AS-BUILT MARK UP BY UTA
A4	4/15/97	ISSUED FOR CONSTRUCTION
A3		
A2		
A1		

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By: _____

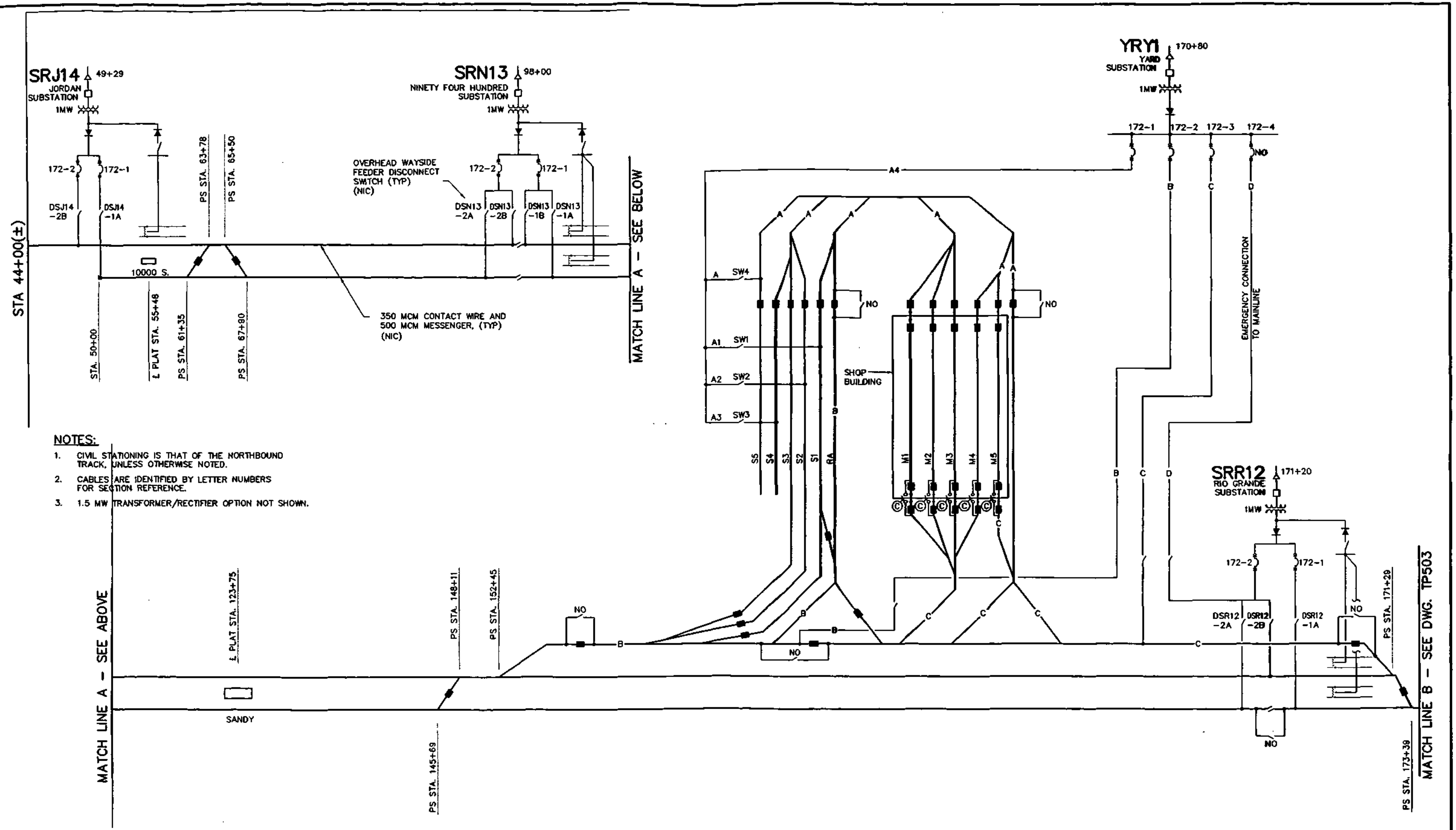
UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By: _____

Designed By:	R.C. DHINGRA
Drawn By:	C.M. WONG
Checked By:	E.J. ROWE
Approved By:	J.M. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
SYMBOLS AND ABBREVATIONS

Scale:	NTS
CADD Filename:	L35TP501
Submittal Date:	12/23/98
UTA Contract No.:	UT-11VT-L35
Drawing No.:	TP501
Sheet No.:	2



NOTES:

1. CIVIL STATIONING IS THAT OF THE NORTHBOUND TRACK, UNLESS OTHERWISE NOTED.
2. CABLES ARE IDENTIFIED BY LETTER NUMBERS FOR SECTION REFERENCE.
3. 1.5 MW TRANSFORMER/RECTIFIER OPTION NOT SHOWN.

REV	DATE	Description
AB	11/11/02	AS-BUILT MARK UP BY UTA
A	4/15/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By: ____________

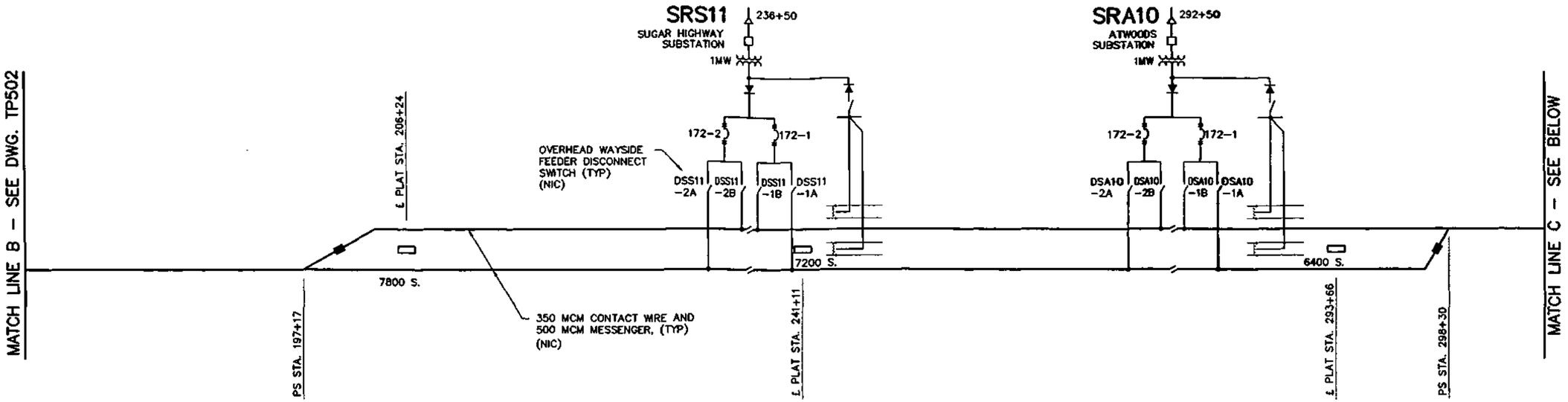
UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

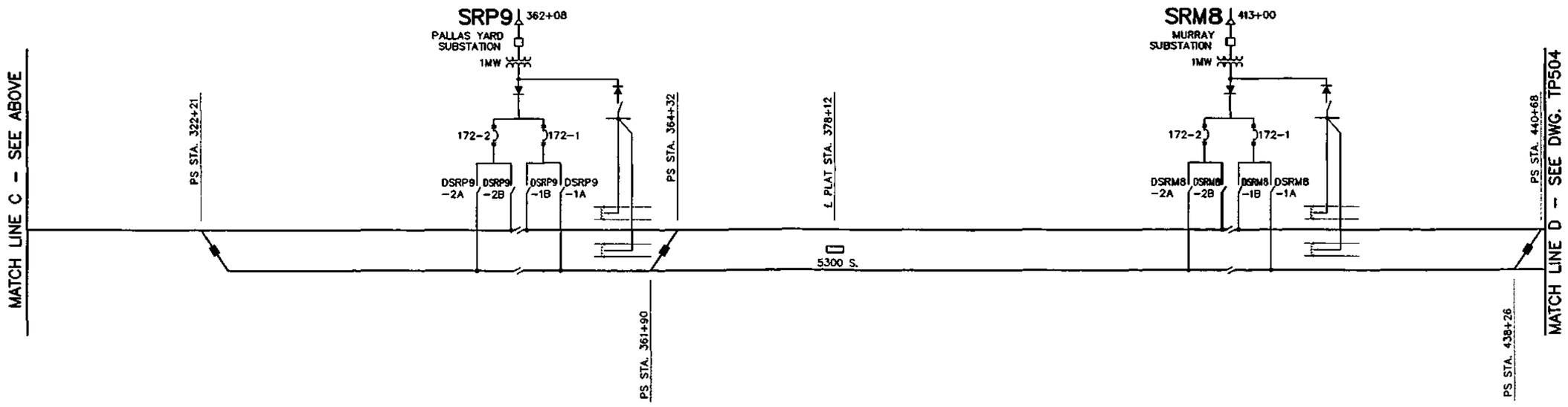
Approved By: ____________

Designed By: R.C. DHINGRA
Drawn By: D.S. TALLITSCH
Checked By: E.J. ROWE
Approved By: J.N. KATZ

TRACTION POWER SUBSTATION PROCUREMENT
MASTER SINGLE-LINE DIAGRAM
SHEET 1 OF 4

Scale: NTS
CADD Filename: L35TP502
Submittal Date: 12/23/96
UTA Contract No.: UT-11VT-L35
Drawing No.: TP502
Sheet No.: 3





REV	DATE	Description
AS	11/11/02	AS-BUILT MARK UP BY UTA
1	4/15/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By: _____

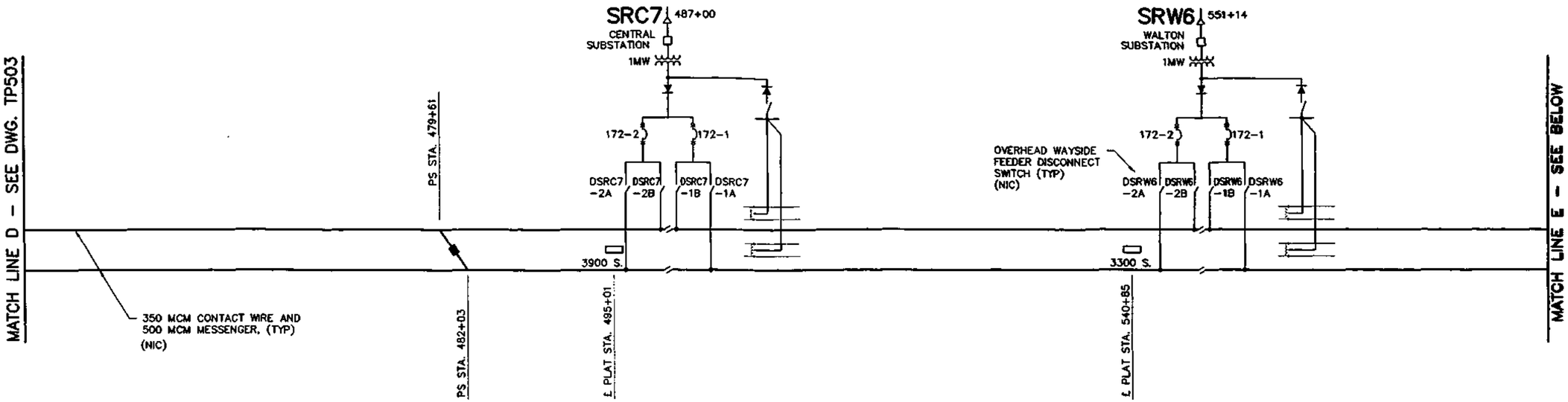
UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

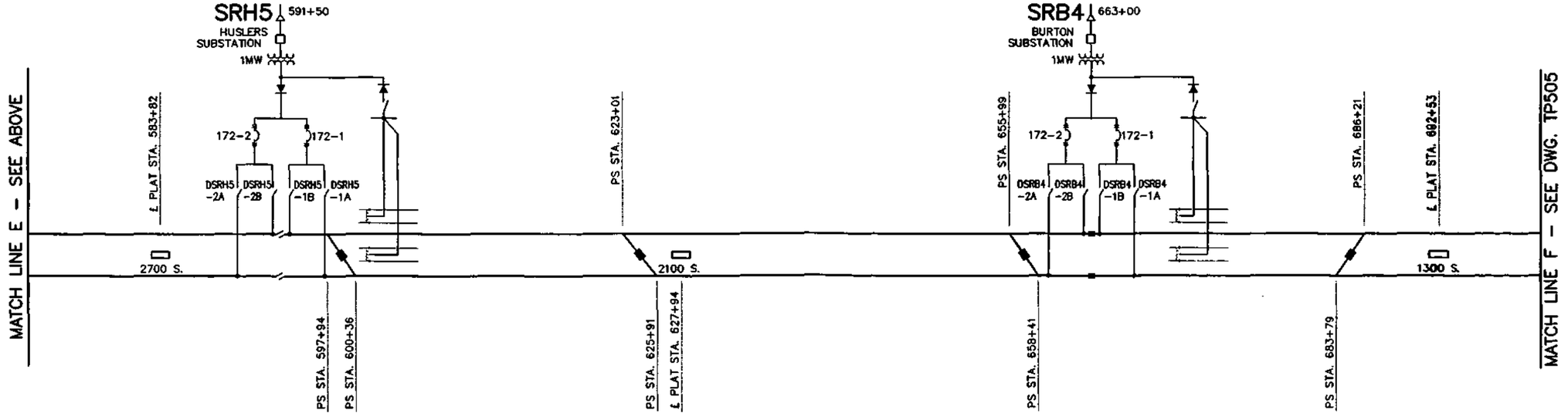
Approved By: _____

Designed By:	R.C. DHINGRA
Drawn By:	D.S. TALLITSCH
Checked By:	E.J. ROWE
Approved By:	J.N. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
MASTER SINGLE-LINE DIAGRAM
SHEET 2 OF 4

Scale:	NTS
CADD Filename:	L35TP503
Submittal Date:	12/23/96
UTA Contract No.:	UT-11VT-L35
Drawing No.:	TP503
Sheet No.:	4





REV	DATE	Description
2	11/11/02	AS-BUILT MARK UP BY UTA
1	4/15/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By: _____

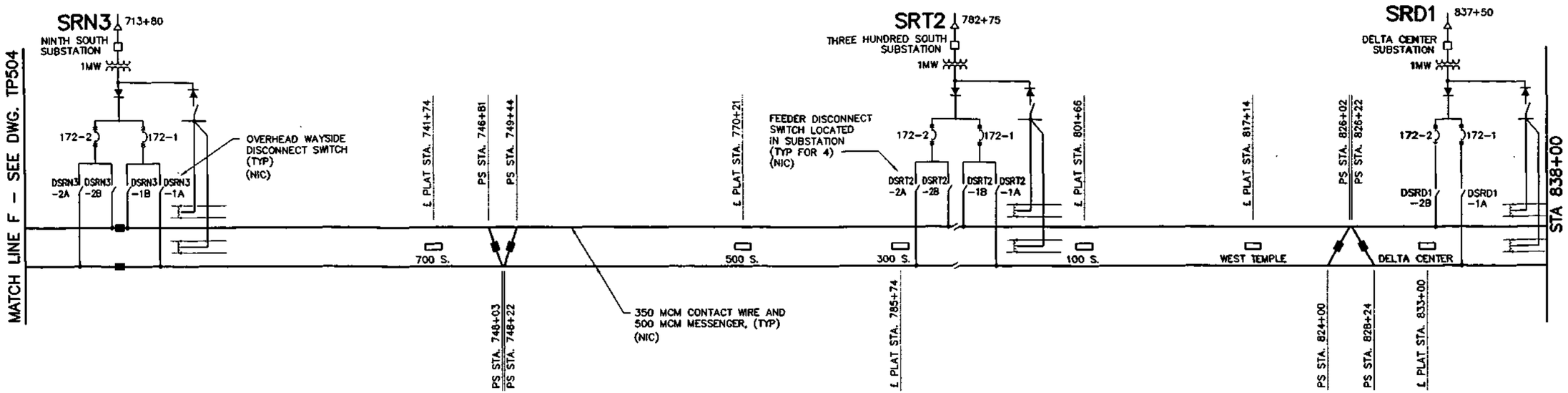
UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By: _____

Designed By:	R.C. DHINGRA
Drawn By:	D.S. TALUTSCH
Checked By:	E.J. ROWE
Approved By:	J.H. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
MASTER SINGLE-LINE DIAGRAM
SHEET 3 OF 4

Scale:	NTS
CADD Filename:	L35TP504
Submittal Date:	12/23/98
UTA Contract No.:	UT-11VF-L35
Drawing No.:	TP504
Sheet No.:	5



REV	DATE	Description
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2		
1		
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As	11/11/02	AS-BUILT MARK UP BY UTA
A	4/15/97	ISSUED FOR CONSTRUCTION

PROJECT CONTROL DATE: 10/08/97 16:10:00 CAD FILENAME: C:\UTA\L35\tp505.DWG (C15) DF/DHL PLOTTED SCALE: 1=500<0>

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PCH Wong Engineering, Inc.
San Francisco, California

Submitted By: _____

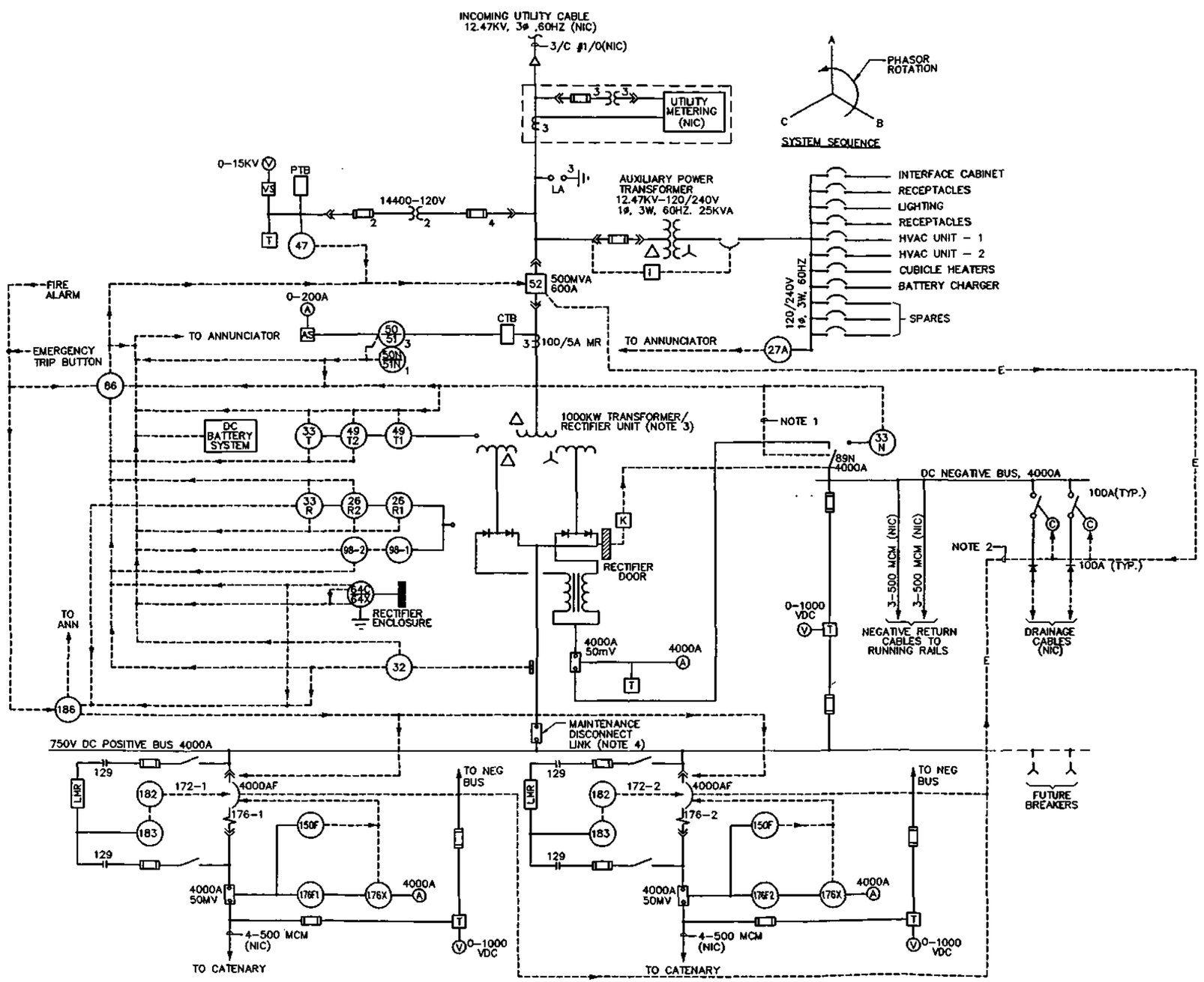
UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By: _____

Designed By:	R.C. DHINGRA
Drawn By:	D.S. TALLITSCH
Checked By:	E.J. ROWE
Approved By:	J.N. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
MASTER SINGLE-LINE DIAGRAM
SHEET 4 OF 4

Scale:	NTS
CADD Filename:	L35TP505
Submittal Date:	12/23/96
UTA Contract No.:	UT-11VT-L35
Drawing No.:	TP505
Sheet No.:	6



NOTES:

1. AC CIRCUIT BREAKER 52 SHALL BE ELECTRICALLY INTERLOCKED WITH SWITCH 89N VIA TIME 86 LOCKOUT.
2. NEGATIVE DRAINAGE CONTACTORS SHALL BE IN CLOSED POSITION WHEN THE FOLLOWING CONDITIONS ARE SATISFIED:
   - AC BREAKER 52 CLOSED
   - DC BREAKER 172–1 AND/OR 172–2 CLOSED

   CONTACTORS SHALL OPEN WHEN ANY OF THESE CONDITIONS ARE NOT SATISFIED.
3. 1000kW TRANSFORMER/RECTIFIER SHOWN ON THE DRAWING. 1500KW TRANSFORMER/RECTIFIER OPTION IS NOT SHOWN.
4. MAINTENANCE LINK TO BE READILY ACCESSIBLE IN THE RECTIFIER CUBICLE.

DEVICE TABLE

DEVICE	DESCRIPTION	REMARKS
26R1	RECTIFIER DIODE OVERTEMP. 1ST STAGE	ANN
26R2	RECTIFIER DIODE OVERTEMP. 2ND STAGE	TRIP
27A	STATION SERVICE POWER: LOSS OF VOLTAGE	
27D	DRAINAGE PANEL CONTROL CIRCUIT: LOSS OF VOLTAGE	(NOT SHOWN IN DIAG.)
27R	RECTIFIER CONTROL CIRCUIT: LOSS OF DC CONTROL POWER	(NOT SHOWN IN DIAG.)
27F1	DC BKR 172–1: LOSS OF DC CONTROL POWER	(NOT SHOWN IN DIAG.)
27F2	DC BKR 172–2: LOSS OF DC CONTROL POWER	(NOT SHOWN IN DIAG.)
32	REVERSE CURRENT INSTANTANEOUS RELAY	TRIP
33N	DOOR SWITCH (NEGATIVE DISC. SW.)	TRIP
33R	DOOR SWITCH (RECTIFIER ENCLOSURE)	TRIP
33T	DOOR SWITCH (TRANSFORMER ENCLOSURE)	TRIP
47	PHASE SEQUENCE VOLTAGE RELAY	TRIP
49T1	TRANSFORMER WINDING OVERTEMP. 1ST STAGE	ANN
49T2	TRANSFORMER WINDING OVERTEMP. 2ND STAGE	TRIP
50/51	INSTANTANEOUS & TIME OVERCURRENT RELAY, PHASE	TRIP
50N/51N	INSTANTANEOUS & TIME OVERCURRENT RELAY, NEUTRAL	TRIP
52	AC CIRCUIT BREAKER	
64C	DC SWITCHGEAR & RECTIFIER ENCLOSURE ALIVE	TRIP
64X	DC SWITCHGEAR & RECTIFIER ENCLOSURE GROUNDED	ANN
86	LOCKOUT RELAY	
89	HIGH VOLTAGE AC LOAD INTERRUPTER SWITCH	
89N	RECTIFIER NEGATIVE DISCONNECT SWITCH	
98–1	RECTIFIER FIRST DIODE FAILED	ANN
98–2	RECTIFIER SECOND DIODE FAILED	TRIP
129	DC FEEDER LOAD MEASURING CONTACTOR	
150F	DC FEEDER RATE OF RISE RELAY	
172	DC FEEDER BREAKER	
176	DC FEEDER INSTANTANEOUS SERIES TRIP DEVICE	
176F	DC FEEDER INSTANTANEOUS OVERCURRENT RELAY	
176X	DC FEEDER AUXILIARY TIMING RELAY FOR 176F	
182	DC FEEDER LOAD MEASURING RECLOSING RELAY	
183	DC FEEDER & TRACTION SYSTEM VOLTAGE SENSING RELAY	
186	DC FEEDER LOCKOUT RELAY	TRIP
LMR	LOAD MEASURING RESISTOR	

PROJECT CONTROL DATE: 10/08/97 16:25:00 CAD FILENAME: C:\UTA\L35TP506.DWG (C2S) 9F/DHL PLOTTED SCALE: 1=1<0>

REV	DATE	Description
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2		
1		
0		
AS	11/11/02	AS-BUILT MARK UP BY UTA
A	4/15/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK – UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By:

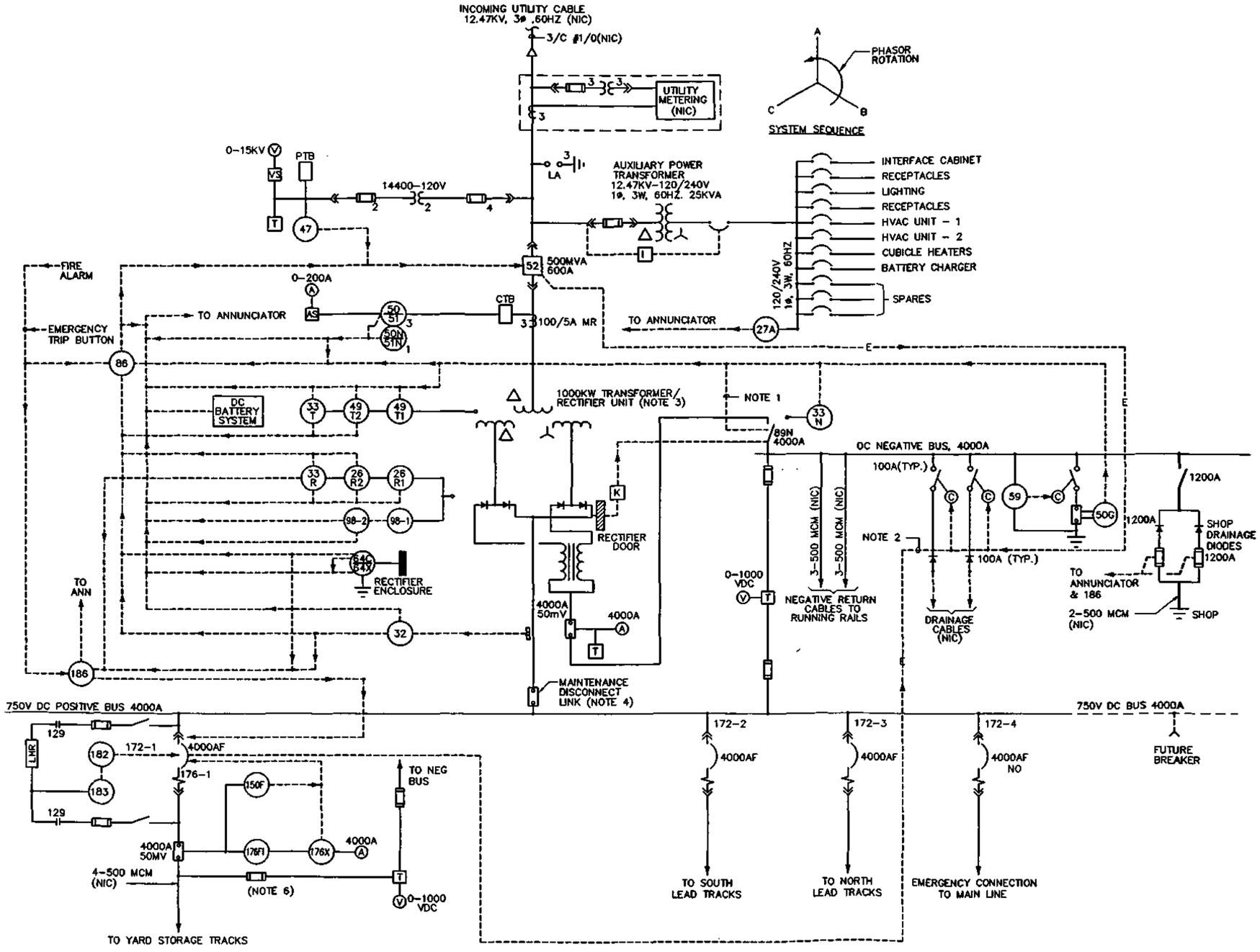
UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By:

Designed By	R.C. DHINGRA
Drawn By	C.M. WONG
Checked By	E.J. ROWE
Approved By	J.N. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
TYPICAL SINGLE–LINE
SUBSTATION METER AND RELAY DIAGRAM

Scale	NONE
CADD Filename	L35TP506
Submittal Date	12/23/98
UTA Contract No.	UT–11VT–L35
Drawing No.	TP506
Sheet No.	7



NOTES:

1. AC CIRCUIT BREAKER 52 SHALL BE ELECTRICALLY INTERLOCKED WITH SWITCH 89N.
2. NEGATIVE DRAINAGE CONTACTORS SHALL BE IN CLOSED POSITION WHEN THE FOLLOWING CONDITIONS ARE SATISFIED:
   - AC BREAKER 52 CLOSED
   - DC BREAKER 172-1 AND/OR 172-2 CLOSED

   CONTACTORS SHALL OPEN WHEN ANY OF THESE CONDITIONS ARE NOT SATISFIED.
3. 1000kW TRANSFORMER/RECTIFIER SHOWN ON THE DWG. OPTION REQUIRES 1500kW TRANSFORMER/RECTIFIER.
4. MAINTENANCE LINK TO BE READILY ACCESSIBLE IN THE RECTIFIER CUBICLE.
5. GROUNDING CONTACTOR TO BE LOCATED IN THE NEGATIVE CUBICLE.
6. DC METERING AND RELAYING SCHEME SHOWN FOR ONE DC CIRCUIT BREAKER TYPICAL FOR ALL.

DEVICE TABLE

DEVICE	DESCRIPTION	REMARKS
26R1	RECTIFIER DIODE OVERTEMP. 1ST STAGE	ANN
26R2	RECTIFIER DIODE OVERTEMP. 2ND STAGE	TRIP
27A	STATION SERVICE POWER: LOSS OF VOLTAGE	
27D	DRAINAGE PANEL CONTROL CIRCUIT: LOSS OF VOLTAGE	(NOT SHOWN IN DIAG.)
27R	RECTIFIER CONTROL CIRCUIT: LOSS OF DC CONTROL POWER	(NOT SHOWN IN DIAG.)
27F1	DC BKR 172-1: LOSS OF DC CONTROL POWER	(NOT SHOWN IN DIAG.)
27F2	DC BKR 172-2: LOSS OF DC CONTROL POWER	(NOT SHOWN IN DIAG.)
32	REVERSE CURRENT INSTANTANEOUS RELAY	TRIP
33N	DOOR SWITCH (NEGATIVE DISC. SW.)	TRIP
33R	DOOR SWITCH (RECTIFIER ENCLOSURE)	TRIP
33T	DOOR SWITCH (TRANSFORMER ENCLOSURE)	TRIP
47	PHASE SEQUENCE VOLTAGE RELAY	TRIP
49T1	TRANSFORMER WINDING OVERTEMP. 1ST STAGE	ANN
49T2	TRANSFORMER WINDING OVERTEMP. 2ND STAGE	TRIP
50/51	INSTANTANEOUS & TIME OVERCURRENT RELAY, PHASE	TRIP
50N/51N	INSTANTANEOUS & TIME OVERCURRENT RELAY, NEUTRAL	TRIP
50G	GROUND RETURN OVERCURRENT RELAY	TRIP
52	AC CIRCUIT BREAKER	
59	VOLTAGE RELAY	
64C	DC SWITCHGEAR & RECTIFIER ENCLOSURE ALIVE	TRIP
64X	DC SWITCHGEAR & RECTIFIER ENCLOSURE GROUNDED	ANN
86	LOCKOUT RELAY	
89	HIGH VOLTAGE AC LOAD INTERRUPTER SWITCH	
89N	RECTIFIER NEGATIVE DISCONNECT SWITCH	
98-1	RECTIFIER FIRST DIODE FAILED	ANN
98-2	RECTIFIER SECOND DIODE FAILED	TRIP
129	DC FEEDER LOAD MEASURING CONTACTOR	
150F	DC FEEDER RATE OF RISE RELAY	
172	DC FEEDER BREAKER	
176	DC FEEDER INSTANTANEOUS SERIES TRIP DEVICE	
176F	DC FEEDER INSTANTANEOUS OVERCURRENT RELAY	
176X	DC FEEDER AUXILIARY TIMING RELAY FOR 176F	
182	DC FEEDER LOAD MEASURING RECLOSING RELAY	
183	DC FEEDER & TRACTION SYSTEM VOLTAGE SENSING RELAY	TRIP
186	DC FEEDER LOCKOUT RELAY	
LMR	LOAD MEASURING RESISTOR	

REV	DATE	Description
A6	11/11/02	AS-BUILT MARK UP BY UTA
A	4/15/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc.
San Francisco, California

Submitted By: _____

UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By: _____

Designed By:	R.C. DHINGRA
Drawn By:	C.M. WONG
Checked By:	E.J. ROWE
Approved By:	J.M. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
TYPICAL SINGLE-LINE
SUBSTATION YRY1 METER AND RELAY DIAGRAM

Scale:	NTS
CADD Filename:	L35TPSS7
Submittal Date:	12/23/02
UTA Contract No.:	99-TRVT-435
Drawing No.:	TPSS7
Sheet No.:	8

LOCKOUT RELAY TRIP 86 — 1	DC FEEDER LOCKOUT RELAY TRIP 186 — 2	AC MAIN CIRCUIT BREAKER TRIP 52 — 3	AC OVERCURRENT TRIP 50, 51, 50N, 51N — 4	NORTH TRACK DC FEEDER BREAKER TRIP 172–1 — 5	SOUTH TRACK DC FEEDER BREAKER TRIP 172–2 — 6
TRANSFORMER WINDING OVERTEMP TRIP 49T2 — 7	TRANSFORMER WINDING OVERTEMP ALARM 49T1 — 8	RECTIFIER DIODE OVERTEMP ALARM 26R1 — 9	RECTIFIER DIODE OVERTEMP TRIP 26R2 — 10	RECTIFIER FIRST DIODE FAILURE ALARM 98–1 — 11	RECIFIER SECOND DIODE FAILURE TRIP 98–2 — 12
BATTERY CHARGER FAILURE ALARM — 13	DC BATTERY UNDERVOLTAGE — 14	DC CONTROL CIRCUITS LOSS OF POWER 27D, 27R 27F1, 27F2 — 15	STATION SERVICE POWER LOSS OF VOLTAGE 27A — 16	LOSS OF DC POWER SUPPLY TO 47, 51 & 51N RELAYS — 17	REVERSE POWER FLOW 32 — 18
TRANSFORMER ACCESS DOOR OPEN 33T — 19	RECTIFIER DOOR OPEN 33R — 20	NEGATIVE DISC SWITCH DOOR OPEN 33N — 21	SPARE — 22	DC ENCLOSURE GROUNDED ALARM 64X — 23	DC ENCLOSURE ALIVE TRIP 64C — 24
FIRE DETECTION SYSTEM ALARM — 25	FIRE DETECTION SYSTEM TROUBLE — 26	SPARE — 27	GROUND RETURN OVERCURRENT TRIP 50G (NOTE 1) — 28	SHOP DRAINAGE FIRST DIODE FAILURE ALARM (NOTE 2) — 29	SHOP DRAINAGE SECOND DIODE FAILURE TRIP (NOTE 2) — 30

NOTE:

1. PROVIDE 50G ANNUNCIATION AT SUBSTATION YRY1 ONLY.
2. PROVIDE ANNUNCIATION FOR SHOP FIRST AND SECOND DIODE FAILURE AND TRIP AT SUBSTATION YRY1 ONLY.

REV	DATE	Description
A5	11/11/02	AS-BUILT MARK UP BY UTA
A4	4/15/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc. San Francisco, California

Submitted By: _____ Approved By: _____

UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Designed By: R.C. DHINGRA
Drawn By: C.M. WONG
Checked By: E.J. ROWE
Approved By: J.N. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
ANNUNCIATOR WINDOW ARRANGEMENT

Scale: NTS
CADD Filename: L35TP509
Submittal Date: 12/23/98
UTA Contract No.: UT-11VT-L35
Drawing No.: TP509
Sheet No.: 9

PROJECT CONTROL DATE: 10/09/97 08:30:00 CAD FILENAME: C:\UTA\L35\tp509.DWG (C21) RD/DHL PLOTTED SCALE: 1=1<D>

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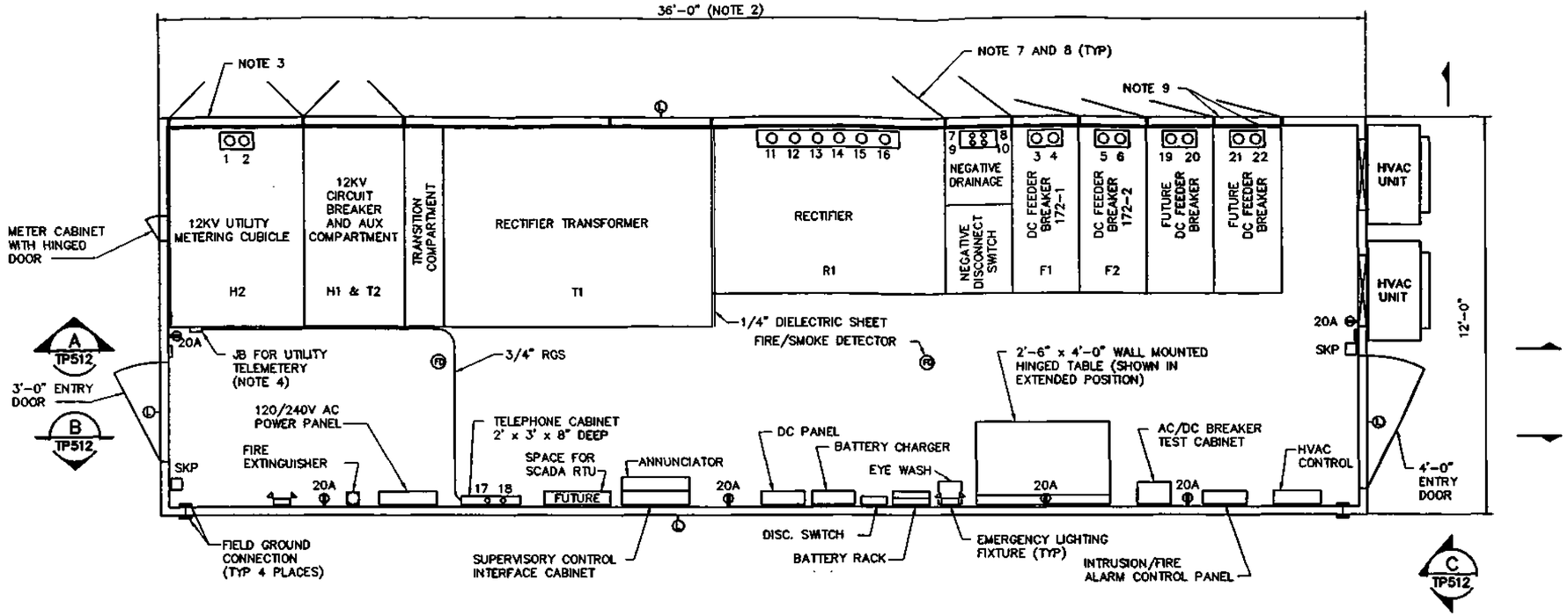


SYMBOL	DESCRIPTION
H2	METERING CUBICLE
H1	12KV BREAKER CUBICLE
T1	RECTIFIER TRANSFORMER
T2	AUXILIARY TRANSFORMER
R1	RECTIFIER
F1,F2	FEEDER CUBICLES
ND	NEGATIVE DRAINAGE COMPARTMENT
CP	CONTROL PANEL
L	OUTDOOR LIGHT FIXTURE
SKP	INTRUSION ALARM KEY PAD

CONDUIT NUMBER	CONDUIT SIZE	FUNCTION
1	4"	12KV AC UTILITY INCOMING CABLE
2	4"	12KV AC UTILITY INCOMING CABLE (SPARE)
3-6	4"	DC POSITIVE FEEDER CABLES
7-10	2"	DC NEGATIVE DRAINAGE CABLES
11-16	4"	DC NEGATIVE RETURN CABLES
17-18	2"	TELEPHONE
19-22	4"	DC FEEDERS FOR FUTURE BREAKERS

NOTES:

1. THIS DRAWING SHOWS A GENERAL LAYOUT OF MAJOR EQUIPMENT. REFER TO THE TECHNICAL SPECIFICATIONS FOR DETAILED REQUIREMENTS.
2. CONTRACTOR MAY PROVIDE AN ALTERNATIVE LAYOUT PLAN SUBJECT TO THE ENGINEER'S APPROVAL. THE LENGTH OF THE SUBSTATION MAY BE REDUCED SUBJECT TO THE ENGINEER'S APPROVAL.
3. CONTRACTOR SHALL PROVIDE ACCESS DOORS WITH PROVISION FOR UTILITY CO.(S) PADLOCK FOR THE 12KV UTILITY METERING COMPARTMENT IN ACCORDANCE WITH UTILITY CO.(S) REQUIREMENTS.
4. MOUNT JUNCTION BOX ABOVE DOOR OF METERING CUBICLE.
5. PROVIDE BRONZE PAD WITH TAP HOLES CONFORMING TO NEMA SPACING REQUIREMENTS FOR 1/2 INCH 13 SILICON BRONZE BOLTS. EACH PAD SHALL BE 4 SQUARE INCH WITH 4 HOLES AT 1 3/4 INCH CENTERS.
6. CUTOUTS FOR INCOMING AND OUTGOING CABLES SHALL BE PROVIDED AS REQUIRED.
7. MAXIMUM WIDTH OF EACH HINGED DOOR ON THE SWITCHGEAR SIDE OF SUBSTATION SHALL NOT EXCEED 2'-0".
8. PROVIDE INTRUSION ALARM DOOR LIMIT SWITCHES ON ALL EXTERIOR DOORS.
9. AT SUBSTATION YRY1, PROVIDE ADDITIONAL DC FEEDER BREAKERS AS INDICATED ON DWG TP507. ADJUST ENCLOSURE SIZE AS NEEDED.
10. SPACE FOR ONE FUTURE BREAKER IS REQUIRED FOR THE SUBSTATION YRY1.

REV	DATE	Description
2	11/11/02	AS-BUILT MARK UP BY UTA
1	4/15/97	ISSUED FOR CONSTRUCTION

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc. San Francisco, California

Submitted By:

UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

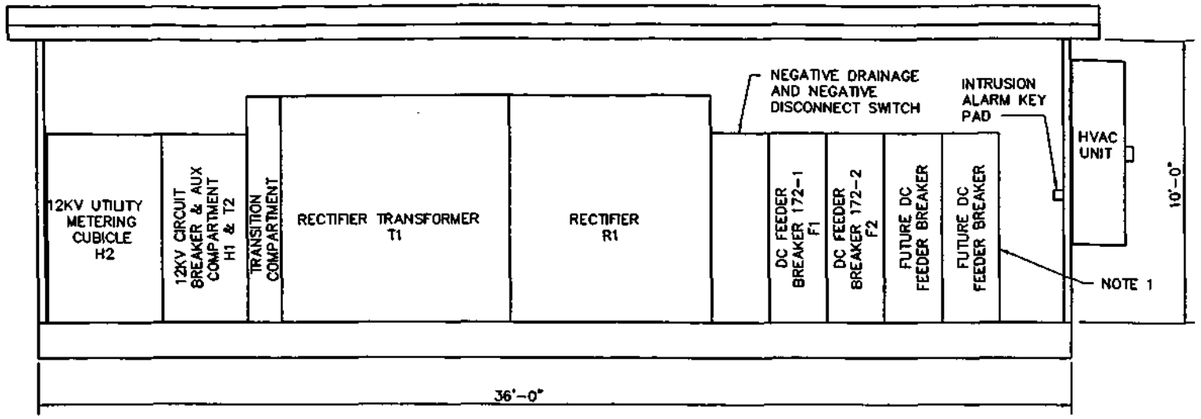
Approved By:

Designed By: R.C. DHINGRA
Drawn By: D.H. LIU
Checked By: E.J. ROWE
Approved By: J.N. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
TYPICAL SUBSTATION
EQUIPMENT ARRANGEMENT
SUBSTATIONS AT GRADE LEVEL AND YRY1

Scale: 1/2"=1'-0"
CADD Filename: L35TP510
Submitted Date: 12/23/98
UTA Contract No.: UT-11VT-L35
Drawing No.: TP510
Sheet No.: 10

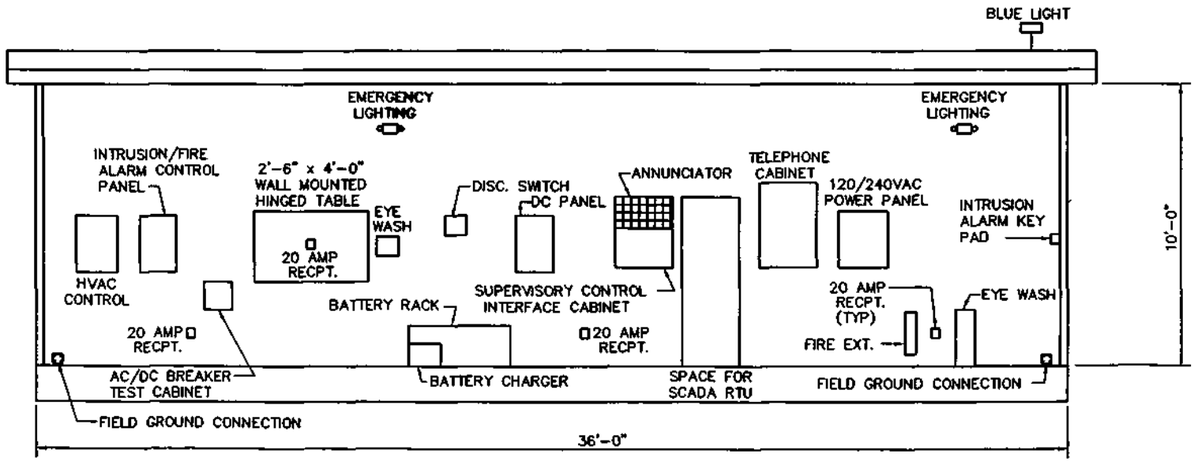
PROJECT CONTROL DATE: 10/09/97 08:38:10 CAD FILENAME: C:\UTA\35tp510.DWG (C25) RD/DHL PLOTTED SCALE: 1=24<0>



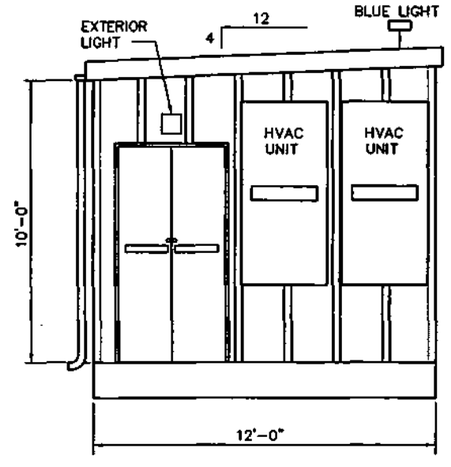
SECTION A TP510

NOTE:

1. FOR SUBSTATION YRY1, PROVIDE ADDITIONAL DC FEEDERS AS INDICATED ON DRAWING TP507 AND SPACE FOR ONE FUTURE DC FEEDER BREAKER. ADJUST ENCLOSURE SIZE AS NEEDED.



SECTION B TP510



SECTION C TP510

REV	DATE	Description
3	11/11/02	AS-BUILT MARK UP BY UTA
2	4/15/97	ISSUED FOR CONSTRUCTION
1		
0		

BASED ON CONTRACTOR AS-BUILT DRAWING RED-LINE MARK - UP

PGH Wong Engineering, Inc. San Francisco, California

Submitted By: _____

UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

Approved By: _____

Designed By:	R.C. DHINGRA
Drawn By:	D.S. TALLITSCH
Checked By:	E.J. ROWE
Approved By:	J.N. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
TYPICAL SUBSTATION
SECTIONS

Scale:	3/8"=1'-0"
CADD Filename:	L35TP512
Submittal Date:	12/23/96
UTA Contract No.:	UT-11VT-L35
Drawing No.:	TP512
Sheet No.:	11

PROJECT CONTROL DATE: 10/09/97 08:45:40 CAD FILENAME: C:\UTA\35tp512.DWG (C23) RD/DHL PLOTTED SCALE: 1=32<0>

EXISTING PARKING GARAGE

UP

SUMP PUMPS BELOW (NIC)

INTAKE AIR

INTAKE FANS (NIC)

5'-0"

5'-10"

FUTURE DC FDR BKR

FUTURE DC FDR BKR

DC FDR BKR 172-2

DC FDR BKR 172-1

2'-0"

13'-6"

OCS MANUAL DISCONNECT SWITCH (NIC)

NEGATIVE DISONNECT SWITCH

NEGATIVE DRAINAGE COMPARTMENT

RECTIFIER

7'-0"

OCS MANUAL DISCONNECT SWITCH (NIC)

EXISTING BRICK BUILDING

6'-0"

24'-0"

24'-6"

DC POWER DISTR PNL

120/240VAC POWER PANEL

TELEPHONE CABINET

BATTERY CHARGER SYSTEM

BATTERY RACK

BUILDING MECHANICAL & ELECTRICAL ROOM

PORTABLE EYEWASH

SUPERVISORY CONTROL INTERFACE CABINET

ANNUNCIATOR

AC/DC BREAKER TEST CABINET

18" COLUMN (TYP)

EXHAUST AIR

EXHAUST FANS (NIC)

RECTIFIER TRANSFORMER

8'-0"

TRANSITION COMPARTMENT

1'-2"

3'-0"

4'-0"

12KV CIRCUIT BREAKER & AUX COMPT, H1 & T2

12KV UTILITY METERING CUBICLE

LADDER

SPRING LOADED HATCH

BASEMENT VAULT 3 HOUR FIRE RATED

13'-6" CLEAR FLOOR TO CEILING

8'-10"

12'-6"

6'-0"

6'-6"

12'-6"

12'-6"

25'-0"

25'-0"

25'-0" TO NEXT COLUMN LINE

EQUIPMENT HATCH AT SIDEWALK (12'x10' INSIDE DIMENSIONS)

A B C D 1 2 3

NOTES:

1. EQUIPMENT DIMENSIONS AND CLEARANCES SHOWN FOR INFORMATION ONLY. ENGINEER TO ADVISE CONTRACTOR OF FINAL DIMENSIONS OF STRUCTURE AND LOCATIONS OF EQUIPMENT.

4' 2' 0' 4' 8'
SCALE: 1/4" = 1'-0"

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2	11/11/02	AS-BUILT MARK UP BY UTA
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UTA TRAX
SALT LAKE BUS/RAIL PROJECT
UTAH TRANSIT AUTHORITY

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Drawn By: D.S. TALLITSCH
Checked By: E.J. ROWE
Approved By: J.N. KATZ

TRACTION POWER SUBSTATION
PROCUREMENT
SUBSTATION EQUIPMENT ARRANGEMENT
UNDERGROUND VAULT
SUBSTATION SRT2

Scale: 1/8" = 1'-0"
CADD Filename: L35TPS14
Submittal Date: 12/23/98
UTA Contract No.: UT-11VT-L35
Drawing No.: TPS14
Sheet No.: 12